

## REMARKS

In the Office Action, the Examiner objected to claim 1 and rejected claims 1-14 under 35 U.S.C. 102(e) as being anticipated by Pedersen et al. (U.S. Patent No. 6,490,717 B1). In this Amendment, Applicants have amended claims 1 and 7, have cancelled claims 9, 11, and 12, and have added new claims 15-24. Accordingly, claims 1-8, 10, and 13-24 will be pending after entry of this Amendment.

### **I. Amendment to the Specification and Drawings**

In this Amendment, Applicants have corrected four typographical errors in the drawings and three typographical errors in the specification. No new matter had been added, as all the corrections are supported by the discussion in the specification and by the illustrations in the figures. Specifically, Applicants moved a "From 615" transitional arrow that previously pointed to operation 660 in the flowchart illustrated in Figure 6B to now point to the operation 655. This change is supported by (1) the referenced transition from 615 to 655 in Figure 6A, (2) the discussion in the specification on page 34, lines 5-7, and (3) the discussion in the specification on page 34, lines 8-22, which provides the rationale as to why the process 600 of Figure 6 transitions to 655 from 615 and 645.

Applicants also corrected the description of the operation 1445 in Figure 14. This correction is supported by the description in the specification on page 51, lines 15-17. In addition, Applicants added a "From 2242" transitional arrow to operation 2228 on Figure 22B. This correction is supported by the description in the specification on page 72, lines 14-15. Applicants also corrected the numbering of operation 2246 in Figure 22C. This correction is supported by the description in the specification on page 72, lines 19-20.

In the specification on page 31, Applicants changed an inaccurate reference to a transition from 615 to 660 in Figure 6B, to an accurate reference regarding a transition from 615 to 655. As

mentioned above, this change is supported by (1) the referenced transition from 615 to 655 in Figure 6A, (2) the discussion in the specification on page 34, lines 5-7, and (3) the discussion in the specification on page 34, lines 8-22, which provides the rationale as to why the process 600 of Figure 6 transitions to 655 from 615 and 645.

On page 72, line 13, Applicants have also changed "2242" to "2202." This is a reference number for the operation that the process 2200 of Figures 22A-22C performs to generate several graphs. As mentioned in the specification on page 65, line 1 to page 66, line 16, the process 2200 generates these graphs at 2202. *See also* page 70, lines 15-17. Finally, on page 73, lines 2-3, Applicants have changed "[a]fter 2244, the process ends," to "[a]fter 2246, the process ends." As shown in Figure 22C, the process 2200 ends after it completes the database tables; as specified in the specification, the process 2200 completes the database tables at 2246, which proceeds 2244 in Figure 22C. *See* page 72, lines 19-20.

## **II. Claim Objections**

The Examiner objected to claim informalities in paragraph 2 of the Office Action. Accordingly, the Applicants have amended claim 1 as suggested by the Examiner.

## **III. Rejections under 35 U.S.C. 102(e)**

In paragraphs 3-11 of the Office Action, the Examiner rejected claims 1-14 under 35 U.S.C. 102(e) as being anticipated by Pedersen et al. (U.S. Patent No. 6,490,717 B1, hereinafter Pedersen). The Applicants are amending claim 1 and, as the rejection might be applied to the amended claim, respectfully traverse. Claim 1 as amended recites a method comprising:

- a) receiving a design;
- b) repeatedly:
  - selecting from the design a candidate sub-network;
  - identifying at least one replacement sub-network from a storage structure that stores replacement sub-networks; and
  - replacing the selected candidate sub-network in the design with the replacement sub-network;

wherein at least a particular one of the replacement sub-networks has multiple circuit elements, wherein at least one of the multiple circuit elements of the particular replacement sub-network is independently selectable by the method in a later iteration of the method for inclusion in a candidate sub-network.

Support for amended claim 1 is found in the specification, for example, on page 28, lines 18-21.

Pedersen does not teach or suggest each recited feature of claim 1. For example, Pedersen does not teach or suggest that a replacement sub-network has multiple circuit elements, where at least one of the multiple circuit elements of the replacement sub-network is independently selectable by the method in a later iteration for inclusion in a candidate sub-network, as recited in claim 1. As such, Applicants submit that claim 1 is in allowable form. Claims 2-8, 10, and 13, and 14 are dependent on claim 1 and are allowable for at least the same reasons as claim 1.

#### **IV. New Claims 15-24**

In this Amendment, Applicants have added claims 15-24. Independent claim 15 includes the “independently selectable” limitation of claim 1 and is allowable for at least the same reasons given for claim 1. Claim 16 is dependent on claim 15 is allowable for at least the same reasons as claim 15.

New independent claim 17 recites a method for performing technology mapping on an initial design that is not bounded to a particular technology, the method comprising:

- a) selecting from the design a first candidate sub-network;
- b) replacing the first candidate sub-network in the design with a first replacement sub-network, the first replacement sub-network being stored in a storage structure that stores replacement sub-networks that are bound to the technology, wherein the first replacement sub-network is comprised of multiple circuit elements;
- c) selecting from the design a second candidate sub-network that includes at least one but not all circuit elements of the first replacement sub-network; and

d) replacing the second candidate sub-network in the design with a second replacement sub-network stored in the storage structure.

Pedersen does not teach or suggest each recited feature of new claim 17. For example,

Pedersen does not teach or suggest selecting from the design a second candidate sub-network that includes at least one but not all circuit elements of a first replacement sub-network, as recited in new claim 17. As such, Applicants submit that claim 17 is in allowable form. Claims 18-20 are dependent on claim 17 and are allowable for at least the same reasons as claim 17.

New claims 21-24 are computer readable medium claims that are similar to claims 17-20. Accordingly, Applicants submit that these claims are patentable over the cited art for the same reasons as stated above for claims 17-20.

#### **V. Information Disclosure Statement**

Accompanying this Amendment is the 1449 form of an Information Disclosure Statement that Applicants are submitting concurrently with but separately from this Amendment. This Information Disclosure Statement lists and provides copies of several additional references for the Examiner's consideration. The Examiner is requested to make these documents of record. Also attached is a second 1449 form of an Information Disclosure Statement that Applicants have submitted prior to submission of this Amendment but which Examiner has not yet made of record. The Examiner is requested to make these documents of record as well.

## CONCLUSION

Based on the foregoing remarks, Applicants believe that the rejections and objections in the Office Action of August 8, 2003 are fully overcome and that the application is in condition for allowance. If the Examiner has any questions regarding the case, the Examiner is invited to contact Applicants' undersigned representative at the number given below.

Respectfully submitted,

STATTLER, JOHANSEN & ADELI LLP

Dated: 1/21/04



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Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

Substitute for form 1449A/PTO

**INFORMATION DISCLOSURE  
STATEMENT BY APPLICANT**

(use as many sheets as necessary)

Application Number 10/062,047

Filing Date 1/31/02

First Named Inventor Steven Teig, et al.

Group Art Unit 2825

Examiner Name

Attorney Docket Number SPLX.P0101

**RELATED U.S. PATENT APPLICATIONS**

Examiner* Initials	Cite No. <sup>1</sup>	U.S. Patent Application		Name of Patentee or Applicant of Cited Document	Date of Filing MM-DD-YYYY	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Serial Number				
	1.	10/062,017		Steven Teig & Asmus Hetzel	01-31-02	
	2.	10/061,459		Steven Teig & Asmuz Hetzel	01-31-02	
	3.	10/062,014		Steven Teig & Asmus Hetzel	01-31-02	
	4.	10/062,044		Steven Teig & Asmuz Hetzel	01-31-02	
	5.	10/066,264		Steven Teig & Asmus Hetzel	01-31-02	
	6.	10/066,188		Steven Teig & Asmus Hetzel	01-31-02	
	7.	10/062,992		Steven Teig & Asmuz Hetzel	01-31-02	
	8.	10/061,474		Steven Teig & Asmus Hetzel	01-31-02	
	9.	10/061,719		Steven Teig & Asmus Hetzel	01-31-02	
	10.	10/066,456		Steven Teig & Asmus Hetzel	01-31-02	
	11.	10/062,993		Steven Teig & Asmuz Hetzel	01-31-02	

**U.S. PATENT DOCUMENTS**

Examiner* Initials	Cite No. <sup>1</sup>	U.S. Patent Document		Name of Patentee or Applicant of Cited Document	Date of Publication MM-DD-YYYY	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Number	Kind Code* (if known)			
	12.	5,649,165		Jain et al.	07-15-97	
	13.	6,301,687	B1	Jain et al.	10-09-01	

Examiner Signature		Date Considered	
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\* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

<sup>1</sup> Unique citation designation number. <sup>2</sup> See attached Kinds of U.S. Patent Documents. <sup>3</sup> Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). <sup>4</sup> For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document.

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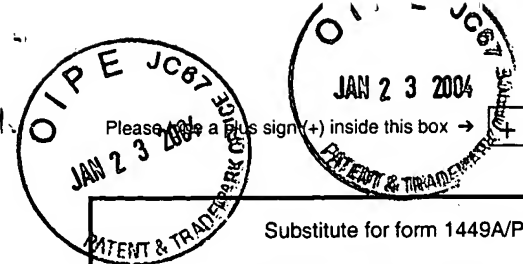
Substitute for form 1449A/PTO  <b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>  <i>(use as many sheets as necessary)</i>				Application Number	10/062,047
				Filing Date	1/31/02
				First Named Inventor	Steven Teig, et al.
				Group Art Unit	2825
				Examiner Name	
Sheet	2	of	2	Attorney Docket Number	SPLX.P0101

OTHER PRIOR ART – NON PATENT LITERATURE DOCUMENTS				
Examiner* Initials	Cite No. <sup>1</sup>	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.		T <sup>6</sup>
	14.	D. Jongeneel, R. Otten, Y. Watanabe and R. K. Brayton, Area and Search Space Control for Technology Mapping, 37 <sup>th</sup> Design Automation Conference, 86-91, 2000.		
	15.	Henrik Reif Andersen, An Introduction to Binary Decision Diagrams, October 1997 (minor revisions April 1998), 36 pp.		
	16.	Jerry Burch and David Long, Efficient Boolean Function Matching, Proc. ICCAD 1992, 408-411.		
	17.	John Fishburn, A Depth-Decreasing Heuristic for Combinational Logic; or How to Convert Ripple-Carry Adder into a Carry-Lookahead Adder or Anything In-Between, Proceedings of the 27 <sup>th</sup> Design Automation Conference, 361-364, 1990.		
	18.	Kamal Chaudhary and Massoud Pedram, A Near Optimal Algorithm for Technology Mapping Minimizing Area under Delay Constraints, Proceedings of the 29 <sup>th</sup> Design Automation Conference, 492-498, 1992.		
	19.	Kurt Keutzer, DAGON: Technology Binding and Local Optimization by DAG Matching, Proceedings of the 24 <sup>th</sup> Design Automation Conference, 341-347, 1987		
	20.	Randal Bryant, Symbolic Boolean Manipulation with Ordered Binary Decision Diagrams, CMU CS Tech Report CMU-CS-92-160.		
	21.	Uwe Hinsberger and Reiner Kolla, Boolean Matching for Large Libraries, Proceedings of the 35 <sup>th</sup> Design Automation Conference, 206-211, June 1998.		
	22.	Yuji Kukimoto, Robert K. Brayton, and Prashant Sawkar, Delay-Optimal Technology Mapping by DAG Covering, Dept. of Electrical Engineering and Computer Science, University of California, Berkeley, Strategic CAD Laboratories, Intel Corp., October 1997.		
	23.	Zbigniew J. Czech, et al., An Optimal Algorithm for Generating Minimal Perfect Hashing Functions, Information Processing Letters, 43(5); 257-264, October 1992		

Examiner Signature		Date Considered	
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*Concurrently submitted*

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				<b>Filing Date</b>	1/31/02
				<b>First Named Inventor</b>	Steven Teig, et al.
				<b>Group Art Unit</b>	2825
				<b>Examiner Name</b>	B. Tat
<b>Sheet</b>	1	of	3	<b>Attorney Docket Number</b>	SPLX.P0101

U.S. PATENT DOCUMENTS					
Examiner* Initials	Cite No. <sup>1</sup>	U.S. Patent Document Number Kind Code <sup>2</sup> (if known)	Date of Publication MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	1.	2002/01570 63 A1	10-24-2002	Besson	
	2.	2002/01784 32 A1	11-28-2002	Kim et al.	
	3.	2003/01452 88 A1	07-31-2003	Wang et al.	
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	7.	5,521,835	05-28-1996	Trimberger	
	8.	5,537,330	07-16-1996	Damiano et al.	
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	11.	5,696,974	12-09-1997	Agrawal et al.	
	12.	5,752,000	05-12-1998	McGeer et al.	
	13.	5,574,441	05-19-1998	Tokunoh et al.	
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	16.	5,903,466	05-11-1999	Beausang et al.	
	17.	5,991,524	11-23-1999	Belkhale et al.	
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	19.	6,035,107	03-07-2000	Kuehlmann et al.	
	20.	6,080,204	06-27-2000	Mendel	

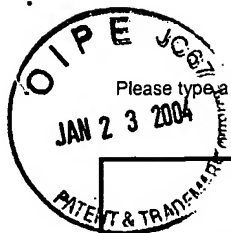
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				<b>Group Art Unit</b>	2825
				<b>Examiner Name</b>	B. Tat
<b>Sheet</b>	2	of	3	<b>Attorney Docket Number</b>	SPLX.P0101

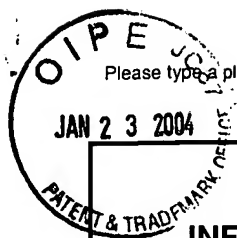
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	22.	6,102,964		08-15-2000	Tse et al.
	23.	6,311,317	B1	10-30-2001	Khoche et al.
	24.	6,301,696		11-09-2001	Lien et al.
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	27.	6,389,586	B1	05-14-2002	McElvain
	28.	6,397,170	B1	05-28-2002	Dean et al.
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	33.	6,470,486	B1	10-22-2002	Knapp
	34.	6,473,884		10-29-2002	Ganai et al
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	36.	6,519,754	B1	02-11-2003	McElvain et al.
	37.	6,519,609	B1	02-11-2003	Touzet
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	40.	6,543,037	B1	04-01-2003	Limquenco et al.
	41.	6,546,539		04-08-2003	Lu et al.
	42.	6,546,541	B1	04-08-2003	Petranovic et al.
	43.	6,574,779	B2	06-03-2003	Allen et al.

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<b>Sheet</b>	3	<b>of</b>	3	<b>Attorney Docket Number</b>	SPLX.P0101

U.S. PATENT DOCUMENTS					
	44.	6,618,835	B1	09-09-2003	Garlapati et al.

NON PATENT LITERATURE DOCUMENTS				
Examiner* Initials	Cite No. <sup>1</sup>	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.		T <sup>6</sup>
	45.	NN78055443, "Automatic Remap", IBM Technical Disclosure Bulletin, Vol. 20, No. 12, May 1978, pp. 5443-5445 (5 pages).		
	46.	NN9411291, "Design of Portable Library using Parameterized Cells", IBM Technical Disclosure Bulletin, Vo.. 37, No. 11, pp. 291-292 (4 pages).		
	47.	Crastes, M. et al., A technology Mapping Method Based on Perfect and Semi-Perfect Matchings, Design Automation Conference, 1991, 28 <sup>th</sup> ACM/IEEE, June 17-21, 1991, pp. 93-98.		
	48.	Devadas, S. et al., Synthesis and Optimization for Robustly Delay-fault Testable Combinational Logic Circuits, Design Automation Conference, 1990, 27 <sup>th</sup> ACM/IEEE, June 24-28, 1990, pp.221-227.		
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	52.	Yi, J. H. et al., Technology Mapping for Storage Elements Based on BDD matching, Proceedings of the 40 <sup>th</sup> Midwest Symposium on Circuits and Systems, pp. 1099-1102, vol.2, August 1997.		

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